

**IMAGE READING DEVICE
BY INTERFERING LIGHT PATH
TO TRIGGER SCANNING PROCESSES**

DESCRIPTION

5

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention generally relates to an image reading device which employs analog output result from the image sensor by the interference of 10 a light path to start preset scanning processes.

Background Description

Scanning devices have been broadly employed to input images. Especially when the personal computer is popular, the scanning device is able to scan a 15 document and thus transform to a digitalized image format. Users can therefore edit, make copies and/or store in a storage device. However, most of the users want a convenient way to start scanning rather than to start scanning application software first as 20 an ordinary procedure of scanning.

Prior known image reading devices are developed to have a switching button. When the user pushes the switching button, the image reading device is initialized to start the scanning. Please refer to

Figure 1. The prior known image reading device 1 includes a body 10, a push button 11, a button base 12, a controlling board 13, a signal cable 14, a scanning module 15, a driving module 16, a document plate 17 and a data bus 18. The scanning module 15 further includes a light source 151, an image sensor 152, a mirror 153 and a focusing lens 154. The image sensor 152 is a CCD (Charged Couple Device) or a CIS (Contact Image Sensor) for generating analog signal output by sensing the light input. When the user wants to proceed the scanning, the user firstly has to place a document on the document plate 17 and pushes the push button 11. When the push button 11 moves down to the button base 12, there is generated a trigger signal to the controlling board 13 via the signal cable 14. A preset process or mode is therefore started such as initialing to scan or to start the scanning program. Accordingly, the preset mode may contain some parameters determined by the user. After the initialization, the light source 151 provides a light to the document and being reflected by the document to the mirror 153. The mirror 153 reflects the light to the focusing lens 154. The light containing image information would be focused on the image sensor 152 for outputting image signals. Once the above process is done, the driving module 16 advances the scanning module to the direction shown as arrow legend in the Figure 1. All the image signals are transmitted through the data bus 18 to the controlling board 13 for signal processing purposes.

In view of the above mentioned image reading device, every element (including the push button 11, the button base 12, the signal cable 14 and so on) are needed to complete the scanning processes. In
5 this case, the cost of the image reading device can be effectively reduced.

Regarding to the forgoing disadvantages of the prior known image reading device, the present invention provides an image reading device to
10 trigger scanning process by detecting the interference of a light path. The light interference mechanism may be utilized with a clip by pushing, moving or rotating methods to interrupt or interfere the light path in order to stop the light being focused on the image sensor. In this case, the output signal from the image sensor may also be changed and detectable for the interference. Thus,
15 the initialization of the image reading device is able to be triggered. Moreover, the image reading device is able to start based on a preset mode by the user to perform a predetermined scanning process.
20

SUMMARY OF THE INVENTION

25 It is therefore an object of the present invention to provide an image reading device without costly a push button or a button base to trigger the scanning process. Instead, a light interference mechanism is employed to trigger and initialize the scanning processes. In this case, the cost and
30

assembling complex would be reduced along with a small body size.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, aspects and
5 advantages will be better understood from the following detailed description of preferred embodiments of the invention with reference to the drawings, in which:

10 Figure 1 is a prior known image reading device;

Figure 2A shows the first embodiment of the present invention utilized with a light interference mechanism at a first position which does not interfere the light path;

15 Figure 2B shows the first embodiment of the present invention utilized with a light interference mechanism at a first position which interferes the light path;

20 Figure 3 shows output image signals from the image sensor without and with light interference occurred respectively;

Figure 4A shows the cross section of the second embodiment of the present invention;

Figure 4B shows the cross section of the second embodiment of the present invention when the light
25 interference is occurring;

Figure 5A shows the cross section of the third embodiment of the present invention;

Figure 5B shows the cross section of the third embodiment of the present invention when the light

interference is occurring; and

Figure 6 shows detections of the image sensor when the light is interfered.

**DETAILED DESCRIPTION OF PREFERRED
EMBODIMENTS OF THE INVENTION**

Please refer to Figures 2A and 2B. Figures 2A and 2B show the first embodiment of the present invention. The image reading device 3 at least includes a scanning module 30 and light interference module 31. The scanning module 30 is the same as the scanning module 15 shown in Figure 1. The scanning module 30 has a light source 301, an image sensor 302, a mirror 303 and a focusing lens 304. The light interference module 31 is a mechanism which is able to move vertically. The user may push, move or rotate the mechanism to interfere the light path by fully interruption or partial interruption. The mechanism may be a simple clip or plate to conduct this function.

When the reading device 3 is under a standby mode, the scanning module was previously driven by a driving module to a standby position, such as the position shown in Figure 2A. In this position, the light source 301 is able to project light to the light interference module 30 and further the light is reflected to plural mirrors 303. By the reflection of the mirrors, the light is focused on the image sensor 302 through the help of the focusing lens 303. The image sensor 302 transform

the light to analog signals such as left side signals shown in Figure 3. When the user would like to proceed the scanning process, the user may push, move or rotate the light interference module 31 from
5 legend A position to lower position legend B as shown in Figure 2B to interfere the light path, making the light unable to advance to the mirrors and image sensor. In this case, the image sensor would not generate image signals and thus output the
10 image signals as the right side pattern shown in Figure 3. The image reading device is therefore able to start a predetermined scanning process and load specific parameters set by the user previously to complete all need scanning processes.

15 Figures 4A and 4B show the second embodiment of the present invention. The difference between the first embodiment and the second embodiment is the positions of the light interference module 41. In the second embodiment, when the user would like to proceed the scanning process, the user may push, move or rotate the light interference module 41 from
20 legend C position to lower position legend D as shown in Figure 4B to interfere the light path, making the light unable to advance to the mirrors and image sensor. In this case, the image sensor would not generate image signals and thus trigger the image reading device to proceed a predetermined scanning process, such as driving the scanning module to an initial position, and load specific
25 parameters set by the user previously to complete all need scanning processes.
30

20000000000000000000000000000000

Figures 5A and 5B show the third embodiment of the present invention. In the third embodiment, when the user would like to proceed the scanning processes, the user may push, move or rotate the 5 light interference module 42 from legend E position shown in Figure 5A to lower position legend F shown in Figure 4B to interfere the light path, making the light unable to advance to the mirrors and image sensor. In this case, by the difference of generated 10 image signals, the image reading device would directly begin some predetermined scanning processes, such as driving the scanning module to an initial position, and load specific parameters set by the user previously to complete all need scanning 15 processes.

In view of the foregoing embodiments, the image reading device is driven to a standby position under a standby mode. When the user employs the light interference module to interfere the light path to stop the light advanced to the image sensor. By 20 detecting the change of the out signals of the image sensor, the image reading device would be triggered to proceed a predetermined scanning process by loading preset scanning control parameters. On the other hand, it would be the standby mode that the 25 light path is interfered by the light interference module. Therefore, if the light path is not interfered, the image reading device would start some predetermined scanning processes, such as driving the scanning module to an initial position, and load specific parameters set by the user 30

previously to complete all need scanning processes.

Accordingly, there would be plural light interference modules or the interfered light path would be segmented in the present invention.

5 Different light interference modules or different interfered segments would be preset different functions, such as scanning, copying, faxing and email transferring.

10 The details of segments of light path are demonstrated in Figure 6. After the reflection of light, the image of an object 6 is focused on the image sensor 302 through the focusing lens 304. The image sensor 302 contains plural segments such as a₁, a₂, a₃, a₄,... along the direction of X axis.

15 The different segments of the image sensor reflects the corresponding segments of the object 6 such as a_{1'}, a_{2'}, a_{3'}, a_{4'}...Therefore, when the segments of a_{1'} to a_{4'} are masked or interfered, the image reading device is able to response a predetermined setting of scanning processes since the light is unable to advance to segments of a₁ to a₄ of the image sensor. The scanning processes may be a copying procedure. Further, when the segments of a_{5'} to a_{50'} are masked or interfered, the image reading device is able to response another predetermined scanning mode, such as faxing or sending scanned image to friends on Internet.

20

25

30

Although preferred embodiments of the present invention have been described in the forgoing description and illustrated in the accompanying

drawings, it will be understood that the invention
is not limited to the embodiments disclosed, but is
capable of numerous rearrangements, modifications,
and substituting of parts and elements without
5 departing from the spirit and scope of the
invention. Accordingly, the present invention is
intended to encompass such rearrangements,
modifications, and substitutions of parts and
elements as fall within the scope of the appended
claims.